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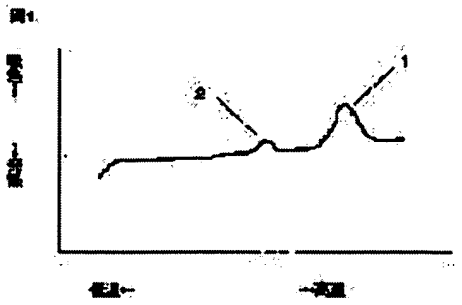
(54) HEAT-RESISTANT FILM AND PRINT CIRCUIT BOARD USING IT AS SUBSTRATE, AND METHOD OF MANUFACTURING THEM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a heat resistant film suitable for an electronics member or the like and particularly having improved edge tearing strength and a print circuit board using it as a substrate, and a method of manufacturing them.



SOLUTION: The heat resistant film comprises a mixture of 100 pts.wt. of a resin composition and an inorganic filler in a range of 5-50 pts.wt., which is treated for crystallization. The resin composition consisting of 70-30 wt.% of a polyarylketone resin (A) has a crystal melting temperature of 260°C and 30-70 wt.% of a non-crystalline polyetherimide resin (B), wherein when the film is heated at a rate of 10°C/min. in a differential scanning calorimetry at least two endothermic peaks are observed, and the two endothermic peaks of which appear at a lower temperature than the peak due to crystal melting of the polyarylketone resin (A) at 260°C.

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* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to these manufacture approaches at the printed-circuit board list which makes a base material the heat-resistant film and this which can be suitably used as a member for electronics etc.
[0002]
[Description of the Prior Art] Since it excels in thermal resistance, fire retardancy, hydrolysis-proof nature, chemical resistance, etc., many crystalline poly aryl ketone resin represented by polyether ether ketone resin is adopted centering on aircraft components, and the electrical and electric equipment and electronic parts. However, the top where a raw material price is very expensive, since the glass transition temperature of resin itself is comparatively as low as about about 140-170 degrees C, as for poly aryl ketone resin, amelioration examination, such as thermal resistance, has been performed variously. As a system which shows good compatibility also in it, the blend with amorphous polyetherimide resin attracts attention. For example, the mixed constituent of crystalline poly aryl ketone resin and amorphous polyetherimide resin is indicated by JP,59-187054,A and the ****** No. 500023 [61 to] official report, and it is indicated at JP,59-115353,A that these constituents are also useful to a circuit plate base material. Furthermore, this invention person etc. has proposed the printed-circuit board using the above-mentioned mixed constituent, and its manufacture approach by JP,2000-38464,A, JP,2000-200950,A, etc.
[0003] However, if a flexible-printed-wiring substrate is produced using the film which consists of a mixed constituent (an inorganic filler etc. is usually included for the improvement in dimensional stability) of crystalline poly aryl ketone resin and amorphous polyetherimide resin There are not necessarily no mechanical strength, especially **** reinforcement of what has good dimensional stability, thermal resistance, etc. in sufficient level, since folding endurance and flexibility are spoiled, the connection dependability of a substrate cannot be secured, but there is a problem that the application range will be limited, and the amelioration was desired. Moreover, there was also no publication which there is no technical disclosure in any way, and is suggested about this cause and amelioration approach in the above-mentioned patent official report.
[0004]
[Problem(s) to be Solved by the Invention] The object of this invention is to provide with these manufacture approaches the printed-circuit board list which makes a base material the heat-resistant film and this suitable as a member for electronics etc. especially whose **** reinforcement improved.
[0005]
[Means for Solving the Problem] As a result of repeating examination wholeheartedly, this invention person used the resin constituent of crystalline poly aryl ketone resin and amorphous polyetherimide resin as the principal component, is giving a specific heat characteristic and came to complete a header and this invention for these manufacture approaches in the printed-circuit board list which makes a base material the heat-resistant film and this which can solve the above-mentioned technical problem.

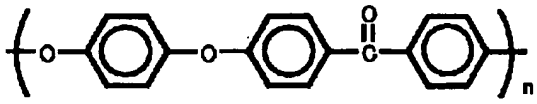
Namely, the place made into the summary of this invention An inorganic filler is mixed in the range of 5 - 50 weight section to the resin constituent 100 weight section which crystal fusion peak temperature becomes from the poly aryl ketone resin (A)70-30 % of the weight which is 260 degrees C or more, and amorphous polyetherimide resin (B)30-70 % of the weight. Are the film which carried out crystallization processing, and when temperature up of this film is carried out by part for heating rate/of 10 degrees C by the differential scanning calorimetry, at least two endoergic peaks appear. It consists in the heat-resistant film characterized by the endoergic peak temperature which appears in a low temperature side rather than the endoergic peak which originates in crystal fusion of poly aryl ketone resin among these endoergic peaks being less than 260 degrees C. [0006] Moreover, another summary of this invention As opposed to the resin constituent 100 weight section which crystal fusion peak temperature becomes from the poly aryl ketone resin (A)70-30 % of the weight which is 260 degrees C or more, and amorphous polyetherimide resin (B)30-70 % of the weight In the printed-circuit board which carries out thermal melting arrival and crystallization processing of the conductive foil through a glue line at least at one side of the film which mixed the inorganic filler in the range of 5 - 50 weight section, and comes to form a conductive circuit in this conductive foil When temperature up of this film is carried out by part for heating rate/of 10 degrees C by the differential scanning calorimetry, at least two endoergic peaks appear. It consists in the printed-circuit board characterized by the endoergic peak temperature which appears in a low temperature side rather than the endoergic peak which originates in crystal fusion of poly aryl ketone resin among these endoergic peaks being less than 260 degrees C. [0007] Furthermore, another summary of this invention consists in the manufacture approach of of the above-mentioned heat-resistant film or printed-circuit board characterized by performing the above-mentioned crystallization processing in the temperature requirement with which are satisfied of the following relational expression.

$Tc(A+B)-20 <= Tx <= Tg(B)+20$ -- among a formula, Tc (A+B) shows the crystallization temperature (degree C) discovered when temperature up of the resin constituent which consists of crystalline poly aryl ketone resin (A) and amorphous polyetherimide resin (B) is carried out by the differential scanning calorimetry, and Tg (B) shows the glass transition temperature (degree C) of an amorphous polyetherimide resin (B) simple substance, and Tx shows crystallization processing temperature (degree C) further here. Moreover, as the above-mentioned crystalline poly aryl ketone resin, the polyetherimide resin which has the repeat unit of the following structure expression (2) can be especially used suitably as a principal component as the polyether ether ketone resin which has the repeat unit of the following structure expression (1), and amorphous polyetherimide resin.

[0008]

[Formula 1]

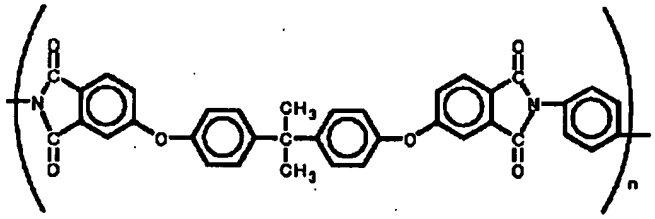
(式1)



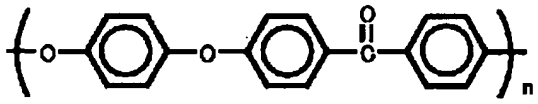
[0009]

[Formula 2]

(式2)

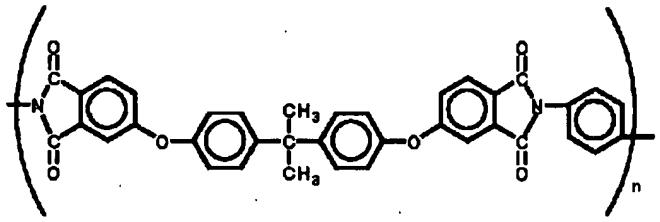


[0010]
[Embodiment of the Invention] Hereafter, this invention is explained in detail. The film of this invention is a film which mixed the inorganic filler in the range of 5 - 40 weight section to the resin constituent 100 weight section which consists of crystalline poly aryl ketone resin (A)70-30 % of the weight and amorphous polyetherimide resin (B)30-70 % of the weight. The sheet about 500 micrometers or more with comparatively thick thickness is also included in the film said to this invention. Here, although the crystalline poly aryl ketone resin which constitutes this invention is thermoplastics which includes nucleus association, ether linkage, and ketone association in the structural unit and there are a polyether ketone, a polyether ether ketone, a polyether ketone ketone, etc. as the example of representation, in this invention, the polyether ether ketone which has the repeat unit shown in the following structure expression (1) is used suitably. The polyether ether ketone which has this repeat unit is marketed as the trade name made from VICTREX "PEEK151G", "PEEK381G", "PEEK450G", etc. In addition, the crystalline poly aryl ketone resin to be used is independent, and one kind can be used for it combining two or more kinds. [0011]
[Formula 1]
(式1)

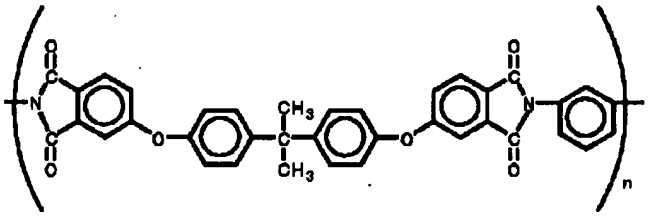


[0012] Moreover, amorphous polyetherimide resin is amorphous thermoplastics including nucleus association, ether linkage, and imide association, and is not especially restricted to the structural unit. The polyether imide which specifically has the repeat unit shown in the following structure expression (2) and (3) is marketed as General Electric a trade name "UltemCRS5001" and "Ultem 1000", and can both apply, respectively. In this invention, the polyether imide which has the repeat unit shown in the following structure expression (2) is used especially suitably. In the mixed constituent of the polyether ether ketone which probably has the above-mentioned structure expression (1) although this reason is not clear, and the polyetherimide resin which has the following structure expression (2), unlike the mixed constituent of the polyether ether ketone in which the electronic interaction between molecules has the above-mentioned structure expression (1), and the polyetherimide resin which has the following structure expression (3), since compatibility differs, characteristic higher order structure is formed and it is thought that this has also contributed to improvement in a mechanical strength (**** reinforcement).
[0013]
[Formula 2]

(式2)



[0014]
[Formula 3]
(式3)



[0015] Although especially the manufacture approach of amorphous polyetherimide resin is not limited, the amorphous polyetherimide resin which has the above-mentioned structure expression (2) usually 4 and 4' -- as a polycondensation object of -[isopropylidene screw (p-phenyleneoxy) JIFUTARU acid 2 anhydride and p-phenylene diamine moreover, the amorphous polyetherimide resin which has the above-mentioned structure expression (3) -- 4 and 4' -- it is compounded by the approach well-known as a polycondensation object of -[isopropylidene screw (p-phenyleneoxy) JIFUTARU acid 2 anhydride and m-phenylenediamine. Moreover, other monomeric units which can be copolymerized in the range which does not exceed the main point of this invention may be introduced into the amorphous polyetherimide resin mentioned above. In addition, the amorphous polyetherimide resin to be used is independent and one kind can be used for it combining two or more kinds. [0016] In the above-mentioned resin constituent, since the crystal structures, such as a spherulite, will grow and develop into altitude if crystalline poly aryl ketone resin exceeds 70 % of the weight, or amorphous polyetherimide resin has the high crystallinity as the whole constituent and performs crystallization processing at less than 30 % of the weight, a mechanical strength (**** reinforcement) tends to fall, and the volumetric shrinkage (dimensional change) accompanying crystallization becomes large and the dependability as the circuit board falls, it is not desirable. Moreover, when crystalline poly aryl ketone resin is less than 30 % of the weight or amorphous polyetherimide resin exceeds 70 % of the weight, the crystallinity as the whole constituent itself is low, and since solder thermal resistance falls even if a crystallization rate also becomes slow too much and crystal fusion peak temperature is 260 degrees C or more, it is not desirable. In this invention, the resin constituent which consists of the 65 - 35 % of the weight of the above-mentioned poly aryl ketone resin and 35 - 65 % of the weight of amorphous polyetherimide resin is suitably used from this.

[0017] Moreover, if the inorganic filler mixed to the resin constituent 100 weight section mentioned above exceeds 50 weight sections, since mechanical strengths, such as the flexibility of a film and tear reinforcement, fall, it is not desirable. Since there is little effectiveness of falling coefficient of linear expansion and on the other hand raising dimensional stability under in 5 weight sections, it is not desirable. The suitable amount of mixing of an inorganic filler is 10 - 30 weight section from this to the resin constituent 100 weight section mentioned above. As an inorganic filler to be used, there is especially no limit and any well-known things can use it. For example, talc, a mica, clay, glass, an alumina, a silica, alumimium nitride, silicon nitride, etc. are mentioned, and these are independent and can use one kind combining two or more kinds. Moreover, surface treatment, such as coupling agent processing of titanate etc., a fatty acid, resin acid, and various surfactant processings, may be performed

to the inorganic filler to be used. Especially, the 20 to 30 or more-about inorganic filler of the effectiveness that mean particle diameter raises dimensional stability, without about 1-20 micrometers and an average aspect ratio (particle size/thickness) reducing a mechanical strength with a low addition (10 - 25 weight section extent) is highly desirable.

[0018] Next, the film of this invention is the film which carried out crystallization processing of the film which consists of a mixed constituent mentioned above, and is the heat-resistant film characterized by for the endoergic peak temperature which at least two endoergic peaks appear when temperature up of this film is carried out by part for heating rate/of 10 degrees C by the differential scanning calorimetry, and appears in a low-temperature side rather than the endoergic peak which originates in crystal fusion of poly aryl ketone resin among these endoergic peaks to be less than 260 degrees C. Here, the weighted solidity acquired when crystallization processing performs a differential scanning calorimetry using the film after crystallization processing in this invention says filling the following relational expression. In the formula of the [(delta Hm-delta Hc) /deltaHm] >=0.90 above, deltaHm is the amount (J/g) of crystal heat of fusions measured when temperature up is carried out by the differential scanning calorimetry, and deltaHc is the amount (J/g) of heat of crystallization generated by crystallization in temperature up. In addition, amount of crystal heat of fusions deltaHm (J/g) and amount of heat of crystallization deltaHc (J/g) are the values calculated as follows. namely, the PerkinElmer, Inc. make -- it asked using DSC-7 from the thermogram when carrying out temperature up of the 10mg of the samples from a room temperature to 400 degrees C by part for heating rate/of 10 degrees C according to JIS-K7122.

[0019] Although it is dependent on the ratio of the class, the molecular weight, and the constituent of a raw material polymer etc., it depends for the value of the above-mentioned relational expression [(delta Hm-delta Hc) /deltaHm] on shaping / processing conditions, especially the crystallization processing conditions of a film greatly. That is, in case a film is produced, after carrying out melting of the raw material polymer, if it cools promptly, this numeric value will become small. Moreover, in crystallization processing conditions, if the processing time is lengthened at a certain processing temperature, this numeric value can be enlarged. The maximum of this numeric value is 1.0, and it means that crystallization is advancing, so that a numeric value is large. Crystallization does not fully advance [this numeric value] less than by 0.90, and it becomes [solder thermal resistance / tend] inadequate in dimensional stability falling and is not desirable here.

[0020] Moreover, although the endoergic peak temperature which originates in crystal fusion of poly aryl ketone resin by the differential scanning calorimetry changes with classes of crystalline poly aryl ketone resin, it appears in about 370-380 degrees C in about 330-340 degrees C and a polyether ketone (PEK) by the polyether ether ketone (PEEK), for example. In this invention, it is most important than the endoergic peak originating in crystal fusion of the poly aryl ketone resin obtained when temperature up is carried out by part for heating rate/of 10 degrees C by the differential scanning calorimetry that the endoergic peak temperature which appears in a low temperature side is less than 260 degrees C. [0021] Since **** reinforcement falls that the endoergic peak temperature which appears in a low temperature side here rather than the endoergic peak originating in crystal fusion of poly aryl ketone resin is 260 degrees C or more, it is not desirable. Although this reason is not clear, the crystal structures, such as a spherulite originating in the crystal component of poly aryl ketone resin (A), grow and develop into altitude, so that this peak temperature rises, these interfaces serve as a defect and it is thought that a mechanical strength (**** reinforcement) falls. The range where the endoergic peak temperature which appears in a low temperature side is more suitable than the endoergic peak which originates in crystal fusion of poly aryl ketone resin from this is 200 degrees C or more and less than 260 degrees C. The endoergic peak temperature which appears in a low temperature side becomes [crystallizing / inadequate] being less than 200 degrees C and is not more desirable than the endoergic peak originating in crystal fusion of the above-mentioned poly aryl ketone resin. In this invention, it mainly depends on crystallization processing conditions for the endoergic peak temperature which appears in a low temperature side rather than the endoergic peak originating in crystal fusion of poly aryl ketone resin. That is, this peak temperature is shifted to a low temperature side, so that this peak temperature is shifted

to an elevated-temperature side, crystallization processing temperature is conversely low so that crystallization processing temperature is high and the processing time is long and the processing time is short. [0022] In this invention, it is desirable to perform crystallization processing mentioned above in the temperature requirement with which are satisfied of the following relational expression. Tc(A+B)-20 <=Tx<=Tg(B)+20 -- among a formula, Tc (A+B) shows the crystallization temperature (degree C) discovered when temperature up of the resin constituent which consists of crystalline poly aryl ketone resin (A) and amorphous polyetherimide resin (B) is carried out by the differential scanning calorimetry, and Tg (B) shows the glass transition temperature (degree C) of an amorphous polyetherimide resin (B) simple substance, and Tx shows crystallization processing temperature (degree C) further here. In the above-mentioned relational expression crystallization processing temperature (Tx) Less than [Tc(A+B)-20], namely, at the crystallization processing temperature below crystallization temperature (degree-C)-20 degree C (Tx) discovered when temperature up of the resin constituent which consists of crystalline poly aryl ketone resin (A) and amorphous polyetherimide resin (B) is carried out by the differential scanning calorimetry Since it is easy to become inadequate late crystallizing the speed of advance of crystallization, if Tg(B)+20 degree C is exceeded on the other hand preferably That is, although crystallization advances enough and also discovers solder thermal resistance, it is easy to fall and is not desirable [crystallization / **** reinforcement], if the glass transition temperature of +20 degrees C of an amorphous polyetherimide resin (B) simple substance is exceeded so that the example mentioned later may also explain.

[0023] Although this reason is not clear, if crystallization processing temperature (Tx) probably exceeds the glass transition temperature of +20 degrees C of an amorphous polyetherimide resin (B) simple substance, the molecular motion nature of an amorphous polyetherimide resin (B) component becomes intense, the crystal structures, such as a spherulite originating in the crystal component of poly aryl ketone resin (A), will grow and develop into altitude from this, these interfaces will serve as a defect, and it will be thought that a mechanical strength (**** reinforcement) falls. Suitable heat-treatment-temperature range is more than Tc(A+B)-15 degree C and less than [Tg(B)+15 degree C] from this.

[0024] Various additives other than other resin and inorganic fillers, for example, a thermostabilizer, an ultraviolet ray absorbent, light stabilizer, a nucleating additive, a coloring agent, lubricant, a flame retarder, etc. may be suitably blended with extent which does not spoil the property in the resin constituent which constitutes this invention film. Moreover, the mixed approach of various additives including an inorganic filler can use a well-known approach. For example, the masterbatch which mixed (a) various additives at high concentration (it is about 10 - 60 % of the weight as a typical content) to suitable base resin, such as poly aryl ketone resin and/or amorphous polyetherimide resin, is produced separately. Concentration is adjusted to the resin which uses this, it mixes, and the approach of blending mechanically using a kneader, an extruder, etc., the approach of using a kneader, an extruder, etc. for the resin which carries out (b) activity, and blending direct various additives mechanically, etc. are mentioned. In the above-mentioned mixed approach, the masterbatch of (a) is produced and the approach of mixing is desirable from the point of dispersibility or workability. Furthermore, on the surface of a film, embossing, corona treatment, etc. may be suitably performed for amelioration of handling nature etc.

[0025] Although a well-known approach, for example, the extrusion cast method, the calender method, etc. using a T die, can be adopted as the film production approach of this invention film and it is not limited especially, the extrusion cast method using fields, such as the film production nature of a film and stable productivity, to a T die is desirable. Although the molding temperature in the extrusion cast method using a T die is suitably adjusted by flowability, film production nature, etc. of a constituent, it is 430 degrees C or less more than the melting point in general. Moreover, although especially the thickness of this film is not restricted, it is usually about 10-500 micrometers.

[0026] Next, the printed-circuit board of this invention is a substrate which carries out thermal melting arrival and crystallization processing of the conductive foil through a glue line at least at one side of the film mentioned above, and comes to form a conductive circuit in this conductive foil. Although the temperature condition is dramatically important in crystallization processing as mentioned above,

especially the method is not limited. For example, as a heat treatment method, the approach (the outline crystallizing method) of crystallizing with an air-heating furnace, a heat press, etc. can be mentioned out of the approach (the in-line crystallizing method) of crystallizing with a heat treatment roll, an air-heating furnace, etc. in the approach (the cast crystallizing method) of crystallizing at the time of the extrusion cast, or a film production line, and a film production line. In this invention, the outline crystallizing method is suitably used from the stability of production, and the homogeneity of physical properties. Moreover, about heat treatment time amount, the range of about 3 hours is suitably applicable from several minutes for several seconds to dozens hours.

[0027] In the manufacture process of a printed wired board, if it is the approach of heating and pressurizing the film mentioned above and conductive foil as an approach of carrying out thermal melting arrival through a glue line, a well-known approach can be adopted and it will not be limited especially. For example, the heat pressing method, the heat lamination rolling method, or the approach that combined these is suitably employable. Moreover, about the approach of making a conductive circuit forming in conductive foil, any well-known approaches can be adopted and it is not limited especially. for example, a subtractive process (etching), an additive process (plating), die stamping (metal mold), and a conductor -- well-known approaches, such as print processes (conductive paste), are applicable. As the approach of the interlayer connection at the time of furthermore considering as a multilayer substrate, the approach of carrying out coppering to a through hole, the approach filled up with a conductive paste or a solder ball all over a through hole and an inner BAIA hole, the method of applying the anisotropic conductive ingredient by the insulating layer containing a detailed electric conduction particle, etc. are mentioned, for example. [0028] As conductive foil used for this invention, the metallic foil with a thickness of about 5-70 micrometers of copper, gold, silver, aluminum, nickel, tin, etc. is mentioned, for example. As a metallic foil, copper foil is usually used and what performed chemical conversion, such as black oxidation treatment, is further used suitably in a front face. In order to heighten the adhesion effectiveness, as for conductive foil, it is desirable to use what roughened beforehand the contact surface (field to pile up) side with a film chemically or mechanically. As an example of the conductive foil by which surface roughening processing was carried out, in case electrolytic copper foil is manufactured, the roughening copper foil processed electrochemically is mentioned.

[0029]

[Example] Although an example explains in more detail below, this invention does not receive a limit at all by these. In addition, the various measured value about a film and assessment which are displayed into this description were performed as follows. Here, the flow direction from the extruder of a film is called a lengthwise direction, and the rectangular direction is called a longitudinal direction.

[0030] (1) The glass-transition-temperature (Tg) crystallization (temperature Tc) crystal fusion peak temperature (Tm)

the PerkinElmer, Inc. make -- DSC-7 -- using -- 10mg of samples -- JIS According to K7121, it asked from the thermogram when carrying out temperature up of the heating rate by part for 10-degree-C/. In addition, the crystallization temperature of the resin constituent of a table 1 was measured using the quenching film sample.

[0031] (2) -- (delta Hm-delta Hc) / deltaHm PerkinElmer, Inc. make -- DSC-7 -- using -- 10mg of samples -- JIS According to K7122, amount of crystal heat of fusions deltaHm (J/g) and amount of heat of crystallization deltaHc (J/g) were calculated and computed from the thermogram when carrying out temperature up of the heating rate by part for 10-degree-C/.

[0032] (3) Bond strength JIS The ordinary state of C6481 tore off and it measured based on strength.

[0033] (4) Solder thermal resistance JIS After having floated for 10 seconds based on the solder thermal resistance of the ordinary state of C6481 so that a solder bath might contact a 260-degree C solder bath a copper foil side in a test piece, and cooling to a room temperature, viewing investigated existence, such as bulging and peeling, and the quality was judged.

[0034] (5) **** reinforcement JIS Based on the tear-strength-propagating trial of C2151, the test piece with a width of face [of 15mm] and a die length of 300mm was cut down from the film with a

thickness of 75 micrometers, and the lengthwise direction and the longitudinal direction were measured the condition for speed-of-testing/of 500mm using the trial metallic ornaments B.

[0035] As shown in a table 1, the polyether ether ketone resin [product [made from Victrex], PEEK381G, Tg:143 degree-C, Tm:334 degree-C] (it may only be hereafter written as PEEK) 50 weight section, (Example 1) Polyetherimide resin [the General Electric make, Ultem-CRS5001, Tg:226 degree C] The extruder equipped with the T die for the mixed constituent which consists of the 50 weight sections and the commercial mica (mean particle diameter: 10-micrometer, aspect ratio:30) 20 weight section is used. (It may only be hereafter written as PEI-1) With the laying temperature of 380 degrees C It extruded on the film with a thickness of 75 micrometers, and the copper foil laminate was obtained by laminating copper foil (thickness: 18 micrometers, surface surface roughening) simultaneously. The processed [crystallization] copper foil laminate made into the object was obtained by carrying out crystallization processing of the roll (100m volume) of the copper foil laminate furthermore obtained for 180 minutes with a 220-degree C thermostat. Evaluated assessment results, such as a heat characteristic and a mechanical strength, are shown in a table 1 using the obtained processed [crystallization] copper foil laminate.

[0036] (Example 2) The processed [crystallization] copper foil laminate made into the object like an example 1 was obtained except having changed crystallization processing conditions in [240 degree-Cx] 120 minutes in the example 1. Evaluated assessment results, such as a heat characteristic and a mechanical strength, are shown in a table 1 using the obtained processed [crystallization] copper foil laminate.

[0037] (Example 3) The processed [crystallization] copper foil laminate made into the object like an example 1 was obtained except having changed into polyetherimide resin [the General Electric make, Ultem-1000, Tg:216 degree C] (it only being hereafter written as PEI-2) PEI-1 used in the example 1. Evaluated assessment results, such as a heat characteristic and a mechanical strength, are shown in a table 1 using the obtained processed [crystallization] copper foil laminate.

[0038] (Example 1 of a comparison) The processed [crystallization] copper foil laminate made into the object like an example 1 was obtained except having changed crystallization processing conditions in [260 degree-Cx] 120 minutes in the example 1. Evaluated assessment results, such as a heat characteristic and a mechanical strength, are shown in a table 1 using the obtained processed [crystallization] copper foil laminate.

[0039] (Example 2 of a comparison) The processed [crystallization] copper foil laminate made into the object like an example 1 was obtained except having changed crystallization processing conditions in [240 degree-Cx] 120 minutes in the example 3. Evaluated assessment results, such as a heat characteristic and a mechanical strength, are shown in a table 1 using the obtained processed [crystallization] copper foil laminate.

[0040]

[A table 1]

(表1)

		実施例			比較例	
		1	2	3	1	2
PEEK (重量部)		50	50	50	50	50
PEI－1 (重量部)		50	50		50	
PEI－2 (重量部)				50		50
マイカ (重量部)		20	20	20	20	20
樹脂組成物の結晶化温度 (℃)		206.1	206.1	229.2	206.1	229.2
非晶性ポリエーテルイミド樹脂のTg (℃)		226	226	216	226	216
結晶化処理温度 (℃)		220	240	220	260	240
結晶化処理時間 (分)		180	120	180	120	120
(ΔHm－ΔHc)／ΔHm(－)		>0.99	>0.99	>0.99	>0.99	>0.99
低温側の吸熱ピーク温度 (℃)		225.8	251.3	225.6	268.9	269.4
ポリアリールケトン樹脂の結晶融解に由来する吸熱ピーク温度 (℃)		331.6	331.2	333.2	331.9	332.1
接着強度 (N／mm)		1．5	1．6	1．6	1．6	1．7
はんだ耐熱性		良好	良好	良好	良好	良好
端裂強度 (N)	縦	145.7	150.9	144.1	149.9	92.3
	横	123.6	67.2	50.4	39．8	23.2
総合評価		○	○	○	×	×

[0041] It turns out that each of examples 1 which have the endoergic peak temperature which appears in a low temperature side rather than the endoergic peak which has the component specified by this invention, and originates in crystal fusion of poly aryl ketone resin from a table 1 in less than 260 degrees C thru/or processed [crystallization] copper foil laminates of 3 is excellent in solder thermal resistance and the property of both mechanical strengths (the **** reinforcement of a film is 50Ns or more for length and a longitudinal direction). On the other hand, it turns out that a substrate 260 degrees C or more has [solder thermal resistance] the **** reinforcement of the longitudinal direction of a good thing inferior in the endoergic peak temperature which appears in a low temperature side rather than the endoergic peak originating in crystal fusion of poly aryl ketone resin.

[0042]

[Effect of the Invention] According to this invention, the printed-circuit board list which makes a base material the heat-resistant film and this suitable as a member for electronics etc. especially whose **** reinforcement improved can be provided with these manufacture approaches.

[Translation done.]

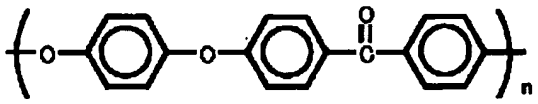
* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

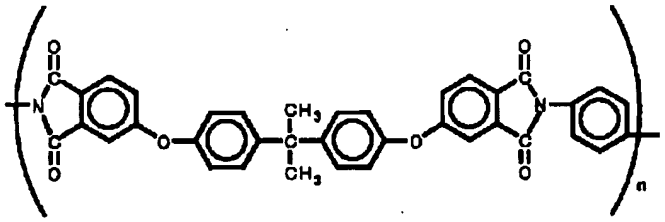
CLAIMS

[Claim(s)]
[Claim 1] An inorganic filler is mixed in the range of 5 - 50 weight section to the resin constituent 100 weight section which crystal fusion peak temperature becomes from the poly aryl ketone resin (A)70-30 % of the weight which is 260 degrees C or more, and amorphous polyetherimide resin (B)30-70 % of the weight. Are the film which carried out crystallization processing, and when temperature up of this film is carried out by part for heating rate/of 10 degrees C by the differential scanning calorimetry, at least two endoergic peaks appear. The heat-resistant film characterized by the endoergic peak temperature which appears in a low temperature side rather than the endoergic peak which originates in crystal fusion of poly aryl ketone resin among these endoergic peaks being less than 260 degrees C.
[Claim 2] As opposed to the resin constituent 100 weight section which crystal fusion peak temperature becomes from the poly aryl ketone resin (A)70-30 % of the weight which is 260 degrees C or more, and amorphous polyetherimide resin (B)30-70 % of the weight In the printed-circuit board which carries out thermal melting arrival and crystallization processing of the conductive foil through a glue line at least at one side of the film which mixed the inorganic filler in the range of 5 - 50 weight section, and comes to form a conductive circuit in this conductive foil When temperature up of this film is carried out by part for heating rate/of 10 degrees C by the differential scanning calorimetry, at least two endoergic peaks appear. The printed-circuit board characterized by the endoergic peak temperature which appears in a low temperature side rather than the endoergic peak which originates in crystal fusion of poly aryl ketone resin among these endoergic peaks being less than 260 degrees C.
[Claim 3] The heat-resistant film according to claim 1 to 2 or printed-circuit board with which the endoergic peak temperature which appears in a low temperature side rather than the endoergic peak originating in crystal fusion of poly aryl ketone resin is in the range of 200 degrees C or more and less than 260 degrees C, and a lengthwise direction and a longitudinal direction are characterized by **** reinforcement (based on the tear-strength-propagating trial of JIS C2151) being 50Ns or more.
[Claim 4] The manufacture approach of of the heat-resistant film according to claim 1 to 3 or printed-circuit board characterized by performing crystallization processing in the temperature requirement with which are satisfied of the following relational expression.
Tc(A+B)-20 <=Tx<=Tg(B)+20 -- among a formula, Tc (A+B) shows the crystallization temperature (degree C) discovered when temperature up of the resin constituent which consists of crystalline poly aryl ketone resin (A) and amorphous polyetherimide resin (B) is carried out by the differential scanning calorimetry, and Tg (B) shows the glass transition temperature (degree C) of an amorphous polyetherimide resin (B) simple substance, and Tx shows crystallization processing temperature (degree C) further here.
[Claim 5] The heat-resistant film according to claim 1 or 2 or printed-circuit board characterized by for the polyether ether ketone resin with which crystalline poly aryl ketone resin (A) has the repeat unit of the following structure expression (1) being a principal component, and the polyetherimide resin with which amorphous polyetherimide resin (B) has the repeat unit of the following structure expression (2) being a principal component.

[Formula 1]
(式１)



[Formula 2]
(式２)



[Translation done.]